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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/736,795	12/14/2000	Michael B. Ball	3817.1US (97-1350.1)	6757

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EXAMINER

PERT, EVAN T

ART UNIT	PAPER NUMBER
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2829

DATE MAILED: 12/04/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/736,795

Applicant(s)

BALL ET AL.

Examiner

Evan T. Pert

Art Unit

2829

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 August 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 6-22, 24-26 and 28-40 is/are pending in the application.
- 4a) Of the above claim(s) 33-40 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-22, 24, 25 and 28-32 is/are rejected.
- 7) ☒ Claim(s) 26 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Species II in Paper No. 10 is acknowledged. Claims 1 through 4, 6 through 22, 24 through 26, and 28 through 32 are "readable on" Species II [per page 8, paper no. 10]. Accordingly, claims 33 through 40 are withdrawn from further consideration as being drawn to a non-elected Species, there being no allowable generic or linking claim.

Terminal Disclaimer

2. The terminal disclaimer filed on May 1, 2002 disclaiming the terminal portion of any patent granted on this application, which would extend beyond the expiration date of U.S. Patent 6,245,594, has been reviewed and is accepted. The terminal disclaimer has been recorded.

Specification

3. The amendment filed 8-28-02 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows:

As in claim 26, using CMP to planarize a polymeric solder mask material, is a newly introduced concept since the originally filed disclosure only teaches CMP for a hard mask such as silicon oxide, but never teaches or suggests planarizing a relatively soft polymeric material by CMP.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-4, 6-22, 24-26, and 28-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1

The “conductive structure” recited in independent claim 1 is recited as “a conductive structure”, then “the conductive structure”, then “a conductive structure”, and finally “the conductive structure”, which leads to confusion as to which “conductive structure” is “imparted with a desired height substantially equal to the thickness” of the layer comprising polymeric material. Furthermore, “substantially equal” is a relative term of degree leaving one of ordinary what the extent of “substantially equal” encompasses.

Claim 22

The “substantially consistent thickness” of the solder mask is “substantially equal to a desired conductive structure height”, while the last line recites “a conductive structure” as well, leaving one wondering what structure corresponds in height to the thickness of the solder mask layer. Furthermore, “substantially equal” is a relative term of degree leaving one of ordinary what the extent of “substantially equal” encompasses.

Claims 22, 24-26 and 28-32

At paragraph [0012], applicant explains that the term "solder mask" as used in the disclosure and claims is "expansive and not limiting", and so the examiner wonders what limitation, if any, is introduced into the claims by a limitation that is actually stated as being "expansive and *not* limiting". What limitation does the claim term "solder mask" introduce if the term "solder mask" is "not limiting" as explained by applicant? For purposes of examination, a "solder mask" is equivalent to anything that serves as a *mask* for forming "conductive elements", not necessarily from "solder".

Claim Objections

5. Claim 26 is objected to for containing new matter as identified in item 2 above. Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 4, 6-14, 17, 19-22, 24, 25, and 29-32 are rejected under 35 U.S.C. 102(b) as being anticipated by Schwiebert et al. (U.S. Patent 5,586,715).

Claim 1

Schwiebert et al. teach disposing a conductive structure (i.e. a bump) on a contact pad (with pitch p in cover figure) comprising: disposing a polymeric material having thickness t [Fig. 1A] that "substantially corresponds" to the height of solder paste

deposit of $L \times t$ in Fig. 1A and also "substantially corresponds" to the height h of the bump structure formed in the openings [wherein the mask is polymeric in "alternate embodiments per col. 7]. The conductive structure with diameter D has its "lateral periphery" at least "partially exposed".

Claim 4

Schwiebert et al. teach "dry film" and "peeling polyimide" which inherently require the recited "adhering" [col. 7].

Claim 6

Schwiebert et al. teach « liquid polymer » as an embodiment for the mask, so it is inherent to "spread" it evenly to get the thickness t , to get bumps of uniform height [col. 7].

Claims 7-14

Schwibert teaches masks with apertures inherently formed before or after being on the substrate, etching holes, removing by etching or peeling [col. 7, plus preferred embodiment].

Claim 17

Chemical etching is equivalent to "exposing to solvent" [col. 7].

Claims 19 and 20

Solder is deposited as "solder paste" which is inherently a type of "elastomer".

Claim 21

The contact pad is exposed in the aperture.

Claim 22

The solder mask of thickness t is "removable" so it is "facilitating a reduction in thickness" simply by its removal by etching it entirely away, for example.

Claim 24

The liquid polymer disclosed inherently forms the layer as it is disposed.

Claim 25

Planarizing is inherent to get a uniform thickness t .

Claim 29

Spinning the liquid (as in "spin-on") is inherent to the use of a liquid polymer mask material.

Claim 30

The material is inherently "spread" to get an even thickness t .

Claim 31

Etching the holes is disclosed before or after applying the mask.

Claim 32

The "photoimageable photomask" disclosed at col. 7 is inherently photosensitive and inherently involves imaging the apertures over the contact pads as recited.

8. Claims 1-3 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Carey et al. (U.S. Patent 5,597,469).

Looking to Fig. 9, the "layer imparting height substantially equal to its thickness"

is seen as polymeric layers 16 and 30 to which molten solder is applied by immersing. The remaining limitations including "forming", "disposing" and "bonding" are inherent [e.g. Figs. 4 through 6].

9. Claims 1, 13, 15-16, 22 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Busacco et al. (U.S. Patent 5,674,595).

The "layer imparting height substantially equal to its thickness" is seen as a composite polymeric layer 22/24, with "forming", "disposing", and "bonding" inherently being disclosed as visible in the figures. Busacco further teaches that the layers inherently "shrink" by an inherent "shrinking agent" of heat energy [col. 3, lines 65-67] and also that the layer is melted/softened when it is formed [col. 2, line 59].

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Evan T. Pert whose telephone number is 703-306-5689. The examiner can normally be reached on M-F (7:00-3:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on 703-308-1233.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ETP
December 1, 2002



EVAN PERT